



EVALUATION OF PROGNOSTIC FACTORS IN OUTCOME OF BOWEL ANASTOMOSIS

General Surgery

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ABSTRACT

Background and objective: Bowel anastomosis is the surgical procedure done in order to establish communication between two formerly distant portions of the bowel. This surgical procedure restores bowel continuity after the removal of a pathological condition affecting the intestines. Good surgical technique and obedience to fundamental principles is vital to ensure successful outcome after bowel anastomosis. Safety in the gastrointestinal surgery may therefore depend to a great extent on the factors that affect the healing of anastomosis. This study was designed to identify risk factors for anastomotic leakage following bowel anastomosis, to study the incidence of early complications after bowel anastomosis and to study mortality rates for bowel anastomosis.

Methods: This study is the prospective hospital based time bound study concerning all patients undergoing Intestinal Resection and Anastomosis at VIMSAR, BURLA from November 2018 to October 2020. Information was collected from detailed history, clinical examination and investigations (both hematological and radiological investigations) on the patients. A total of 150 patients undergoing resection and anastomosis for different diseases were studied.

Results: In present study, Out of the 150 cases 6 cases were less than 20 years, 117 cases were between 20-60 years and 27 cases were more than 60 years. Upon comparing anastomotic leak in each age group, 33.3% of the patient undergoing anastomosis in the elderly, more than 60 years age group developed anastomotic leak as compared to the 7.7% in the 20-60 years group. Out of the total 150 patients including in the study, male patients numbered 114, accounting for 76% of the total study population. Women on the other hand contributed to 24% of the total number. 18 patients developed anastomotic leak. Among these 18 patients, 12 patients presented with more than 1 day delay accounting for 66.7% of the total. 87 patients (58%) underwent a small bowel to small bowel anastomosis. 39 patients or 26% underwent a small to large bowel anastomosis.

Conclusion: Anastomotic leak rate is unaffected by the type of anastomosis performed. Malnourished (those with low serum albumin levels) patients are at a greater risk for developing anastomotic leak, SSI, morbidity & mortality following bowel anastomosis. In the emergency setting, malnourished patients (after attending the primary pathology) should be ideally considered for creation of a temporary stoma to tide the crisis over and closure of stoma considered in second setting. However if an anastomosis is deemed necessary, these patients should be observed thoroughly for any signs of leak postoperatively and should be intervened at the earliest. Considering enteral nutritional optimization before elective surgery may be useful in reducing the morbidity and mortality rate.

KEYWORDS

Intestinal anastomosis; Anastomotic leak; Anastomotic dehiscence, resection

INTRODUCTION:

Intestines form a major part of human digestive system. Both in terms of length as well as surface area, the small and large intestines constitute about 90% of the digestive system. They play a major role in absorption of nutrients, water and other micro nutrients. Any pathological condition of the bowel leads to disturbance in the homeostasis of the human body. Timely intervention and correction of the pathologies affecting the bowel is of utmost importance in providing a healthy functional life to the patient. One of the most common surgeries done on the intestines is resection and anastomosis. History of bowel anastomosis goes back to early 17th and 18th century. Galen was the first person to coin the term "Anastomosis". From the 17th century to the modern times intestinal resection and anastomosis remains one of the most common yet very challenging surgeries the surgeon faces. This is the significance of the following study.

OBJECTIVES OF THE STUDY:

The primary objective of this study is to identify the patient's clinical and surgical factors that affect the outcome of intestinal resection and anastomosis and predispose to anastomotic leak.

REVIEW OF LITERATURE:

The experience of bowel surgery until the latter part of the nineteenth century was limited to dealing with protruding intestine following abdominal injury, which was sustained during wars. Sushruta, an Indian surgeon of 6th century B.C wrote oldest known descriptions of bowel surgery. He described using a cautery over the swelling of strangulated hernias and used the mandibles of black ants to clamp the edges of bowel wounds together.

The colonic epithelium derives almost 75% of its energy needs from these fatty acids through metabolism to carbon dioxide, ketone bodies,

and lipid precursors. There is also a prompt change in the colour of viable bowel when 100% oxygen is inhaled. The intra-arterial injection of fluorescein followed by ultraviolet lamp illumination may be used to evaluate the regional perfusion. A hand-held Doppler ultrasound device in a sterile cover may also be useful in verifying the arterial supply. The segment of bowel to be removed must be isolated with an adequate resection margin. The mesentery, with its contained blood vessels should be serially clamped and divided. The noncrushing intestinal clamps are applied at proposed site of resection and the artery clamps applied on the specimen side. The bowel can be resected using knife or diathermy. The outer posterior row is placed first. The inner row is then placed, posterior wall first, followed by the anterior wall. The anterior outer row is the last completed. Intraoperative complications such as injury to relevant anatomic structures such as ureters, spleen, bowel, and duodenum are related to the surgical technique, to blurred anatomic landmarks and layers owing to the disease (e.g., peritonitis or massive adhesions), or to the patient's habitus (e.g., obesity). Complications of surgery may be of a general or surgery-specific nature and can be classified with regard to the time of their occurrence as either early (within the first 30 days) or late (after 30 days)⁹. The morbidity rate following intestinal anastomoses ranges from 51.8% to 10-13.

METHODOLOGY & METHODS:

This study was conducted with the approval of institutional ethical committee. 150 cases requiring intestinal resection and anastomosis admitted in Department of General Surgery, VIMSAR, Burla were selected after applying inclusion and exclusion criteria.

These cases were followed up intra operatively and post operatively until discharge from hospital or another outcome like anastomotic leak or death of the patient.

INCLUSION CRITERIA:

Patients age >18yrs, Patients requiring intestinal resection and anastomosis.

EXCLUSION CRITERIA:

Patient's age <18yrs Pregnant women, prisoners, cognitively impaired subjects Immuno compromised.

RESULTS:

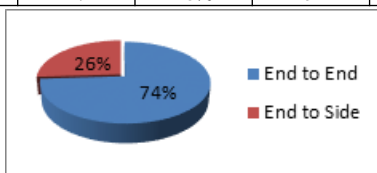
Out of the 150 cases 6 cases were less than 20 years, 117 cases were between 20-60 years and 27 cases were more than 60 years. Upon comparing anastomotic leak in each age group, 33.3% of the patient undergoing anastomosis in the elderly, more than 60 years age group developed anastomotic leak as compared to the 7.7% in the 20-60 years group. Out of the total 150 patients including in the study, male patients numbered 114, accounting for 76% of the total study population. Women on the other hand contributed to 24% of the total number. Only 6 patients or 4% of the total were diabetic. Number of patients suffering from cardiac disease was 9, accounting for 6% of the total. 3 patients were suffering from kidney disease. In this study 24 out of 150 cases studied had a haemoglobin concentration less than 10g/dl. Upon following the patients postoperatively, 6 out of the 24 anaemic patients developed anastomotic, i.e. 25% of the anaemic patients developed anastomotic leak. On comparison, out of the 126 patients with haemoglobin more than 10g/dl, 12 patients developed anastomotic leak. This amounts to only 9.5% of the 126 patients.

In the study 21 patients had elevated blood urea and serum Creatinine while 129 patients were in the normal range. Out of the 21 patients with elevated renal parameters, 12 patients developed anastomotic leak. Whereas, among the 129 normal patients, only 6 patients developed anastomotic leak, which accounts of a very minimal 4.6%.

26% patients included in the study had an elevated random blood sugar. Among these 12 patients developed anastomotic leak. That is 30.7% of the patients with hyperglycaemia developed anastomotic leak. In contrast, only 6 patients or 5% of the patients with a normal random blood sugar developed anastomotic leak. 20% underwent resection and anastomosis as a part of treatment for malignancies. On comparing the numbers of anastomotic leak, maximum number of anastomotic leak (15 in number) was encountered in patients who underwent resection for bowel gangrene. This number amounts to a leak rate of a huge 20% among the patients with bowel gangrene. 18 patients developed anastomotic leak. Among these 18 patients, 12 patients presented with more than 1 day delay accounting for 66.7% of the total. 87 patients (58%) underwent a small bowel to small bowel anastomosis. 39 patients or 26% underwent a small to large bowel anastomosis. 27 patients underwent anastomosis between two large bowel segments. Out of the 18 patients who developed leak, 15 patients had undergone end to side anastomosis. This amounts to a leak rate of 38.5% among the patients who underwent end to side anastomosis.

Table 1: Age Predisposition With Anastomotic Leak

Age	No. of Cases (T=150)		Anastomotic leak	
<20	6	4%	0	0%
20-60	117	78%	9	7.7%
>60	27	18%	9	33.3%

**Chart : Type Of Anastomosis****Table 2: sex Predisposition With Anastomotic Leak**

Sex	No of cases (T=150)		Anastomotic leak	
Male	114	76%	18	100%
Female	36	24%	0	0

Table 3: types Of Anastomosis With Anastomotic Leak

	No of cases (T=150)		Anastomotic leak	
SS	87	58%	3	3.44%
SL	39	26%	15	38.4%
LL	24	16%	0	0%

Table 4: Comorbidities distribution

Comorbidities	No of cases (T=150)	
Diabetes	6	4%
Cardiac disease	9	6%
Renal	3	2%
Others	12	8%
No comorbidities	120	80%

DISCUSSION:

This is a prospective study carried out on all the patients undergoing Intestinal Resection and Anastomosis at Department of General Surgery in VIMSAR, Burla. A dangerous complication of intestinal anastomosis is anastomotic leak causing peritonitis, which results in high morbidity and mortality rates. The factors which add to anastomotic leak include hypoalbuminemia¹⁶, advanced age, presence of intra-abdominal sepsis¹⁷, rectal location of the disease⁵⁰, ASA grade 2 or above¹⁹, perioperative blood transfusion¹⁰ and anaemia^{8,13}. The rate of anastomotic leak observed in this thesis is 12%. The reported rate of anastomotic leak ranges between 0.8 to 35%. Hypoalbuminemia, intra-abdominal sepsis, anemia, old age and perioperative steroid use were the prognostic factors which were found to be statistically significant. Hypoalbuminemia is very crucial for development of anastomotic leak. Most common procedure in our study was emergent small bowel resection and anastomosis (58% small to small bowel, 26% small to large, 16% large to large bowel). Amit et al¹⁰ reported a mortality rate of 17.1% in their prospective study on patients undergoing emergent small bowel resection. H Westapel et al²¹ reported that the mortality rate of 18% and it increased to 30% in patients with no history of previous abdominal surgeries. Strong point of this thesis is its prospective nature. Age adversely affects anastomotic healing. Elderly patients are at a higher risk for anastomotic leak. Female sex appears to be better protected against anastomotic leak. Impaired vascularity or gangrene is the predominant risk factor for anastomotic leak. Anaemia, elevated renal parameters, elevated blood sugar and low serum albumin predisposes to anastomotic leak. End to side anastomosis and anastomosis between small bowel and large bowel has a higher risk for anastomotic leak. Transfusion of TPN appears to be protective and helps in better healing of the anastomosis. Limitations include the small sample size, non uniformity of surgical indications and lack of randomization. A study group of 150 patients is not at all sufficient to accurately comment on a multifactorial outcome like the successful healing of the anastomosis. Apart from all the factors discussed above, experience of the operating surgeon in handling the bowel and creating an anastomosis influences the outcome of an anastomosis. This is something that cannot be quantitatively assessed.

CONCLUSION:

Intestinal anastomosis carries with it considerable mortality and the morbidity. Emergency small bowel anastomoses and intra-abdominal infection have a great risk of anastomotic leak despite attention to technical details during the procedure. Anastomotic leak rate is unaffected by the type of anastomosis performed. Malnourished (those with low serum albumin levels) patients are at a greater risk for developing anastomotic leak, SSI, morbidity & mortality following bowel anastomosis. Serum albumin levels can be used as a simple, reliable and economical prognostic marker in predicting the outcome of bowel anastomoses. This helps the surgeon in operative decision making as well as explaining the prognosis and operative risk to the patient. Patients with intra-abdominal sepsis and patients treated with perioperative corticosteroids for pulmonary disease carry a significant risk for anastomotic dehiscence. Therefore in this patient category, it is recommended that anastomoses should be protected by a diverting stoma. In the emergency setting, malnourished patients (after attending the primary pathology) should be ideally considered for creation of a temporary stoma to tide the crisis over and closure of stoma considered in second setting. However if an anastomosis is deemed necessary, these patients should be observed thoroughly for any signs of leak postoperatively and should be intervened at the earliest. Considering enteral nutritional optimization before elective surgery may be useful in reducing the morbidity and mortality rate.

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